

REMARKS

Claims 2 and 10 have been amended to replace “or” with “and.” Claims 3 and 4 have been amended to clarify that the recited weight percentages are based on a total weight of the composite medium. Support for the latter amendment is found in the as-filed specification at at least paragraph [0050]. Claim 4 has also been amended to improve antecedent basis. Claim 9 has been amended to insert the term “of.”

The Office Action mailed August 8, 2006, has been received and reviewed. Claims 1-17 are currently pending in the application. Claims 1-17 stand rejected. Applicants have amended claims 2-4, 9, and 10, and respectfully request reconsideration of the application as amended herein.

35 U.S.C. § 103(a) Obviousness Rejections**Obviousness Rejection Based on U.S. Patent No. 6,034,149 to Bleys et al.**

Claims 1-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,034,149 to Bleys *et al.* (“Bleys”). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for an obviousness rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The obviousness rejection of claims 1-17 is improper because the cited reference does not teach or suggest all of the limitations of the claims and does not provide a motivation to produce the claimed invention.

Bleys teaches a hydrophilic polyurethane foam formed by reacting a prepolymer with water. Bleys at column 1, lines 57-67 and column 4, lines 6-9. The prepolymer is formed by reacting a polyisocyanate with a polyetherpolyol. *Id.* The polyetherpolyol is formed by

polymerizing ethylene oxide. *Id.* at column 3, lines 13-17. A polyetherpolyol containing dispersed polymer particles is also taught and is formed by polymerizing one or more vinyl monomers, such as acrylonitrile and styrene, in polyoxyalkylene polyols. *Id.* at column 3, lines 47-55. A superabsorbent polymer (“SAP”) is impregnated or incorporated in the polyurethane foam. *Id.* at column 4, lines 60-64. The SAP is prepared by polymerizing a diallyl dialkyl quaternary ammonium salt with a polyfunctional divinyl compound and/or a crosslinker. *Id.* at column 5, lines 52-55. The crosslinker is triallyl methylammonium chloride. *Id.*

Bleys does not teach or suggest the limitation of “at least one trialkyl methylammonium compound homogenously dispersed in a polyacrylonitrile matrix,” as recited in claim 1, because Bleys does not teach or suggest a polyacrylonitrile matrix, at least one trialkyl methylammonium compound, or that at least one trialkyl methylammonium compound is dispersed in a polyacrylonitrile matrix. The Examiner states that column 3, lines 47-51 of Bleys teaches “dispersed acrylonitrile” and column 5, lines 52-55 teaches “triallyl methylammonium chloride.” Office Action of August 8, 2006, p. 2. Applicants respectfully disagree for the reasons set forth below.

Bleys does not teach or suggest the limitation of “a polyacrylonitrile matrix.” As known in the art, polyacrylonitrile is a polymer formed from acrylonitrile monomers. While Bleys teaches forming a polymer-modified polyether polyol by polymerizing acrylonitrile, styrene, and polyoxyalkylene polyols, the product of this reaction is not polyacrylonitrile. As clearly taught in Bleys, the product is a polymer-modified polyether polyol that includes polymer particles dispersed in the polyether polyol. Applicants respectfully submit that the product is not, and can not be, polyacrylonitrile because the starting materials of the reaction include polyoxyalkylene polyols, acrylonitrile, and styrene.

By referring to “dispersed acrylonitrile,” the Examiner recognizes that Bleys teaches acrylonitrile and not polyacrylonitrile. Office Action of August 8, 2006, p. 2. However, the Examiner appears to rely on the mere mention in Bleys of acrylonitrile and a polymerization reaction as teaching or suggestion the limitation of “a polyacrylonitrile matrix.” The Examiner overlooks the fact that polyoxyalkylene polyols and styrene, in addition to acrylonitrile, are starting materials of the polymerization reaction and that a polymer-modified polyether polyol having polymer particles dispersed in the polyether polyol is produced. Since the reaction product is not polyacrylonitrile, Applicants respectfully submit that Bleys does not teach or

suggest the limitation of “a polyacrylonitrile matrix.”

The Examiner states that “Applicant appears to admit that Bleys discloses polymerization of acrylonitrile.” Office Action of August 8, 2006, p. 6. However, once again, the Examiner mischaracterizes Applicants’ arguments. Applicants have not admitted, and do not admit, that Bleys teaches forming polyacrylonitrile. While Applicants admit that a polymerization reaction is taught in Bleys and that acrylonitrile is taught as one of the starting materials, Applicants do not admit that the polymerization reaction produces polyacrylonitrile. Rather, as explained above and as clearly taught by Bleys, the polymerization reaction produces a polymer-modified polyether polyol. This product is not polyacrylonitrile because the starting materials of the reaction include polyoxyalkylene polyols, acrylonitrile, and styrene.

Bleys also does not teach or suggest the limitation of “at least one trialkyl methylammonium compound.” While Bleys teaches using triallyl methylammonium chloride, triallyl methylammonium chloride is not a trialkyl methylammonium compound. As such, Bleys does not teach the trialkyl methylammonium compound recited in claim 1. The triallyl methylammonium chloride of Bleys also does not suggest the trialkyl methylammonium compound recited in claim 1. The Examiner states that “[t]he disclosure of ‘triallyl’ [in Bleys] is deemed to encompass or at least suggest the claimed ‘trialkyl.’” Office Action of August 8, 2006, p. 3. In the instant Office Action, the Examiner has not provided any objective reasons in support of this assertion. Furthermore, the Examiner’s reasons in previous Office Actions are conclusory for the reasons described in Applicants’ responses filed on July 19, 2006, and April 18, 2006.

The Examiner states that “Applicant appears to admit that triallyl methylammonium chloride is disclosed, which would at least suggest trialkyl methylammonium compound to one of ordinary skill in the art at the time the invention was made.” Office Action of August 8, 2006, p. 6. While Applicants acknowledge that Bleys teaches using triallyl methylammonium chloride as a crosslinker, Applicants do not admit, and have not admitted, that the triallyl methylammonium chloride teaches or suggests a trialkyl methylammonium compound. Again, the Examiner has mischaracterized Applicants’ previous arguments for the reasons described in Applicants’ responses filed on July 19, 2006, and April 18, 2006. In addition, the Examiner has not provided objective reasons in support of this statement. Applicants respectfully submit that the use of triallyl methylammonium chloride would not suggest to a person of ordinary skill in

the art to use a trialkyl methylammonium compound because alkyl and allyl groups have different chemical reactivities.

The Examiner also states that “Applicant appears to admit that the only potential perceived difference is the presence of double bonds and that both, in any case, contain carbon-carbon single bonds.” Office Action of August 8, 2006, p. 6. Once again, the Examiner has mischaracterized Applicants’ arguments for the reasons described in Applicants’ responses filed on July 19, 2006, and April 18, 2006. Furthermore, the mere fact that triallyl methylammonium chloride and trialkyl methylammonium contain carbon-carbon single bonds does not provide any motivation or suggestion to replace the former by the latter. In addition, the Examiner has overlooked Applicants’ previous arguments that trialkyl methylammonium chloride and triallyl methylammonium have different chemical reactivities due to the presence of carbon-carbon single bonds versus carbon-carbon double bonds.

The Examiner states that trialkyl methylammonium chloride is suggested by triallyl methylammonium chloride because “Applicant appears to admit that both compounds contain the same elements, including ‘carbon-carbon’ single bonds, which would obviously, to one of ordinary skill in the art suggest either trialkyl or triallyl.” Office Action of May 19, 2006, p. 6. While Applicants acknowledge that trialkyl methylammonium chloride and triallyl methylammonium chloride include similar elements (*i.e.*, carbon, hydrogen, nitrogen), Applicants have not admitted, and do not admit, that this similarity provides any suggestion to produce the claimed invention. Furthermore, the Examiner’s reasoning is conclusory because the mere fact that trialkyl methylammonium chloride and triallyl methylammonium chloride include the same elements does not suggest a reason for replacing the latter by the former in Bleys. In addition, the Examiner overlooks the fact that alkyl groups and allyl groups have different chemical reactivities due to the presence of carbon-carbon single bonds versus carbon-carbon double bonds. This difference in reactivity would not provide any teaching or suggestion to replace the triallyl methylammonium chloride in Bleys with a trialkyl methylammonium chloride.

Applicants also respectfully submit that the Examiner’s statement that Applicants are arguing features that are not recited in the claims is, at best, specious. As known in the art, an alkyl group is a hydrocarbon derived from an alkane, which includes carbon-carbon single bonds. Therefore, an alkane, by definition, is a saturated group. As such, it is disingenuous for the Examiner to state that “Applicant does not claim saturated trialkyl which contains ‘only single

bonds.’”

Finally, Bleys does not teach or suggest the limitation of “at least one trialkyl methylammonium compound dispersed in a polyacrylonitrile matrix.” As discussed above, Bleys does not teach or suggest the limitations of “at least one trialkyl methylammonium compound” and “a polyacrylonitrile matrix.” Therefore, Bleys necessarily does not teach or suggest “at least one trialkyl methylammonium compound dispersed in a polyacrylonitrile matrix.” In addition, the Examiner appears to ignore the language recited in claim 1. Specifically, claim 1 recites that the at least one trialkyl methylammonium compound is dispersed in a polyacrylonitrile matrix. While the Examiner argues that Bleys teaches “dispersed acrylonitrile” and “triallyl methylammonium chloride” (see Office Action of August 8, 2006, p. 2), this teaching does not correspond to the above-mentioned limitation of claim 1. Therefore, even assuming *arguendo* that the Examiner’s summary of Bleys is correct, Bleys does not teach or suggest the above-mentioned limitation of claim 1 because claim 1 recites that the at least one trialkyl methylammonium compound is dispersed, not that the acrylonitrile is dispersed.

Applicants also respectfully submit that since the triallyl methylammonium chloride of Bleys is used as a crosslinker, the triallyl methylammonium chloride would not be present in the resulting SAP or in the resulting polyurethane foam. Rather, the triallyl methylammonium chloride would have reacted with the diallyl dialkyl quaternary ammonium salt and the polyfunctional divinyl compound to produce the SAP. Therefore, the triallyl methylammonium chloride would not be dispersed in the SAP or in the resulting polyurethane foam.

The cited references also do not provide a motivation to combine to produce the claimed invention. To provide a motivation or suggestion to combine, the prior art or the knowledge of a person of ordinary skill in the art must “suggest the desirability of the combination” or provide “an objective reason to combine the teachings of the references.” M.P.E.P. § 2143.01. “[I]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” *Id.*

Nothing in Bleys suggest the desirability of, or provide an objective reason for, using a trialkyl methylammonium compound in place of the triallyl methylammonium chloride. Rather, the teachings of Bleys are limited to using triallyl methylammonium chloride as a crosslinker.

Bleys does not suggest the desirability of, or provide an objective reason for, using other compounds, such as a trialkyl methylammonium compound, as a crosslinker in the production of its polyurethane foam.

Furthermore, Applicants respectfully submit that even if Bleys were modified to include a trialkyl methylammonium compound, the SAP impregnated in the polyurethane foam of Bleys would not be produced because the trialkyl methylammonium compound could not function as a crosslinker. As known in the art, a crosslinker needs a reactive, polymerizable group, such as a double bond, triple bond, allylic group, etc. See, U.S. Patent No. 5,906,734 to Girot *et al.* (“Girot”) at column 9, lines 51-60. Since a trialkyl methylammonium compound does not include such a reactive, polymerizable group, the trialkyl methylammonium compound would not function as a crosslinker. Since the proposed modification would render the SAP impregnated in the polyurethane foam of Bleys unsatisfactory for its intended purpose, there is no motivation to make the proposed modification.

Since Bleys does not teach or suggest the above-mentioned limitations and does not provide a motivation to produce the claimed invention, the obviousness rejection of claim 1 is improper and should be withdrawn.

Claims 2-7 are allowable, *inter alia*, as depending from claim 1.

Claim 2 is further allowable because Bleys does not teach or suggest that the trialkyl methylammonium compound is trialkyl methylammonium nitrate or trialkyl methylammonium chloride.

Claim 5 is further allowable because Bleys does not teach or suggest that the trialkyl methylammonium compound comprises homogeneous substantially spherical particles.

Claim 6 is further allowable because Bleys does not teach or suggest a substrate at least partially impregnated with the at least one trialkyl methylammonium compound homogeneously dispersed in the polyacrylonitrile matrix.

Claim 7 is further allowable because Bleys does not teach or suggest a substrate that comprises glass fiber, paper, or polytetrafluoroethylene.

Bleys also does not teach or suggest all of the limitations of independent claim 8 or provide a motivation to produce the claimed invention. Specifically, Bleys does not teach or suggest the limitation of “dissolving polyacrylonitrile in a solvent to form a matrix solution” because the prepolymer taught in Example 1 is formed by the polymerization of a polyether

having random oxyethylene and oxypropylene residues and 4,4'-methylene diphenylene diisocyanate. While this prepolymer is mixed with water, this prepolymer is not polyacrylonitrile. Therefore, Bleys necessarily does not teach or suggest the above-mentioned limitation. Furthermore, the Examiner's reliance on column 3, lines 47-51 of Bleys as teaching "dispersed acrylonitrile" is incorrect for the reasons discussed above. Therefore, the sections of Bleys relied upon by the Examiner do not teach or suggest the above-mentioned limitation.

Bleys also does not teach or suggest the limitation of "combining at least one trialkyl methylammonium compound with the matrix solution to form a homogenous, composite medium solution" because Bleys does not teach or suggest a trialkyl methylammonium compound for the reasons discussed above.

Bleys also does not teach or suggest the limitation of "diluting the solvent of the matrix solution." While Bleys teaches mixing a prepolymer with water, this forms an aqueous solution of the prepolymer. However, claim 8 recites diluting the solvent of the matrix solution. As such, this limitation implies further diluting an already-existing solution. However, nothing in Bleys teaches or suggests diluting the solution formed from the prepolymer and water.

Bleys also does not teach or suggest the limitation of "solidifying the homogenous, composite medium solution." The Examiner appears to suggest that the production of the polyurethane foam of Bleys teaches or suggests this limitation. However, since Bleys does not teach or suggest combining at least one trialkyl methylammonium compound with the matrix solution to form the homogenous, composite medium solution, Bleys necessarily does not teach or suggest solidifying such a homogenous, composite medium solution.

Bleys does not provide a motivation to produce the claimed invention for substantially the same reasons discussed above.

Since Bleys does not teach or suggest the above-mentioned limitations and does not provide a motivation to produce the claimed invention, the obviousness rejection of claim 8 is improper and should be withdrawn.

Claims 9-17 are allowable, *inter alia*, as depending from claim 8.

Claim 10 is further allowable because Bleys does not teach or suggest combining trialkyl methylammonium nitrate or trialkyl methylammonium chloride in the matrix solution.

Claim 12 is further allowable because Bleys does not teach or suggest depositing portions of the composite medium solution into a water bath.

Claim 13 is further allowable because Bleys does not teach or suggest forming homogenous, substantially spherical beads from the portions of the composite medium solution.

Claims 14 and 15 are further allowable because Bleys does not teach or suggest impregnating the homogenous, composite medium solution into a substrate, or that the substrate is glass fiber, paper, or polytetrafluoroethylene, respectively.

Claim 16 is further allowable because Bleys does not teach or suggest depositing the substrate into a water bath.

Claim 17 is further allowable because Bleys does not teach or suggest entrapping the at least one at least one trialkyl methylammonium compound in the polyacrylonitrile.

Obviousness Rejection Based on Bleys in view of Girot

Claims 1-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bleys in view of Girot. Applicants respectfully traverse this rejection, as hereinafter set forth.

The 35 U.S.C. § 103(a) obviousness rejections of claims 1-17 are improper because the cited references do not teach or suggest all of the claim limitations and do not provide a motivation to combine to produce the claimed invention.

Girot teaches a passivated porous support that includes a porous solid matrix and a polymer network. Girot at column 4, lines 47-59. The polymer network includes a main monomer, a passivation monomer, and a crosslinking agent. *Id.* The porous solid matrix is a hydrophobic polymer. *Id.* at column 5, lines 6-14. In Examples 2 and 17, methacrylamidopropyl trimethyl ammonium chloride is used.

The cited references do not teach or suggest all of the limitations of claim 1. As discussed above, Bleys does not teach or suggest the limitation of “at least one trialkyl methylammonium compound dispersed in a polyacrylonitrile matrix.” Girot does not cure the deficiencies in Bleys because Girot does not teach or suggest the limitations of “a polyacrylonitrile matrix” and “at least one trialkyl methylammonium compound.” Therefore, Girot necessarily does not teach or suggest the limitation of “at least one trialkyl methylammonium compound dispersed in a polyacrylonitrile matrix.”

The Examiner relies on Examples 2 and 17 of Girot as teaching “trimethyl ammonium chloride.” Office Action of August 8, 2006, p. 4. However, in actuality, the compound taught in these examples is methacrylamidopropyl trimethyl ammonium chloride. Applicants respectfully

submit that methacrylamidopropyl trimethyl ammonium chloride is not a trialkyl methylammonium compound, as recited in claim 1. Methacrylamidopropyl trimethyl ammonium chloride has a methacrylamidopropyl group and three methyl groups as the substituents on the nitrogen atom of the ammonium chloride. This methacrylamidopropyl group is not an alkyl group. In contrast, the trialkyl methylammonium compound, as recited in claim 1, has three alkyl groups and one methyl group as substituents on the nitrogen atom. Since methacrylamidopropyl trimethyl ammonium chloride is not a trialkyl methylammonium compound, as recited in claim 1, Girot does not teach or suggest the above-mentioned limitation.

The Examiner states that “[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to use the ‘trimethyl’ of Girot as the ‘triallyl’ group of the methyl ammonium chloride of Bleys because Bleys discloses ‘triallyl’ ammonium chloride in a sorbent and Girot discloses the trimethyl ammonium chloride for use in preparation of exchange resins.” Office Action of August 8, 2006, p. 4. However, this reasoning is conclusory for the reasons discussed in Applicants’ response filed on July 19, 2006.

The cited references also do not provide a motivation to combine to produce the claimed invention. Since Girot does not teach or suggest trimethyl ammonium chloride, Bleys and Girot, when combined, do not suggest the desirability of, or provide an objective reason for, using trimethyl ammonium chloride in place of the triallyl ammonium chloride of Bleys.

Furthermore, even if Bleys and Girot were combined, the claimed invention would not be taught or suggested because methacrylamidopropyl trimethyl ammonium chloride would be present in the polyurethane foam of Bleys, not trimethyl ammonium chloride.

Since the cited references do not teach or suggest the above-mentioned limitations and does not provide a motivation to produce the claimed invention, the obviousness rejection of claim 1 is improper and should be withdrawn.

Claims 2-7 are allowable, *inter alia*, as depending from claim 1. Claims 2 and 5-7 are further allowable for the reasons discussed above.

The cited references also do not teach or suggest all of the limitations of claim 8 and do not provide a motivation to combine to produce the claimed invention. As discussed above, Bleys does not teach or suggest the limitations of “dissolving polyacrylonitrile in a solvent to form a matrix solution,” “combining at least one trialkyl methylammonium compound with the matrix solution to form a homogenous, composite medium solution,” “diluting the solvent of the

matrix solution,” and solidifying the homogenous, composite medium solution. Girot does not cure the deficiencies in Bleys because Girot does not teach or suggest polyacrylonitrile and at least one trialkyl methylammonium compound. Therefore, Girot necessarily does not teach or suggest the above-mentioned limitations.

The cited references also do not provide a motivation to combine to produce the claimed invention for the above-mentioned reasons.

Claims 9-17 are allowable, *inter alia*, as depending from claim 8. Claims 10 and 12-17 are further allowable for the reasons discussed above.

ENTRY OF AMENDMENTS

The amendments to claims 2-4, 9, and 10 should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add new matter to the application.

CONCLUSION

Claims 1-17 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain that might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,

/Stephen R. Christian/

Stephen R. Christian
Registration No. 32,687
Attorney for Applicants
P.O. Box 1625
Idaho Falls, ID 83415-3899
Phone: (208) 526-9140
Fax: (208) 526-8339

Date: 23 October 2006